

ABSTRACT OF THE DISCLOSURE

A semiconductor quantum memory element is disclosed which can share the terminals easily among a plurality of memory elements and can pass a high current and which is strong against noise. In order to accomplish this a control electrode is formed so as to cover the entirety of thin film regions connecting low-resistance regions. As a result, the element can have a small size and can store information with high density. Thus, a highly integrated, low power consumption non-volatile memory device can be realized with reduced size. A method of forming a memory element is also disclosed including performing the following steps of forming a first insulating layer, a second insulating layer, a first conductive layer and a layer of amorphous silicon. The amorphous silicon layer is crystallized to a polycrystalline silicon film. Semiconductor drains are deposited to form charge trapping and storage regions. A fourth insulating layer is deposited over the drains and a second conductive layer is deposited over a layer of silicon dioxide to form a control electrode of the memory element.

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